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ABSTRACT

The main purposes of this survey were to: (1) assess the perceptions and attitudes of students about whether boys or girls spend more time working with computers; (2) explore whether individual students at school prefer working alone or with someone else; (3) explore the possibility that girls who have access to home computers also have older brothers at home; (4) inquire about parents' use or nonuse of computers at work or at home; and (5) continue to assess the extent to which parents are providing home computers for daughters as well as for sons. A total of 212 fourth through sixth grade students from both private and public schools were surveyed over a two-year period in a deliberate effort to branch from a previous study in which fifth grade, seventh grade, and high school students were surveyed on similar issues. Chi-square analysis of the data for the present study failed to find significant sex differences with respect to any of the questions although instances of sex-typing in relationship to computers were identifiable in the survey responses. Based on the findings of this study, it is concluded that mandated computer instruction should be initiated at the third or fourth grade level, if not earlier, in order to overcome gender barriers to equitable computer learning at school and assumed future career opportunities associated with higher technology. Results of the statistical analysis are displayed in two graphs and 11 references are listed. (CGD)

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Boys, Girls, and a Scarcity of Microcomputers: "They Get on It before We Can Get to It"

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Boys, Girls, and a Scarcity of Microcomputers:
"They Get on It before We Can Get to It"

Frequently elementary schools have only one microcomputer for each classroom or perhaps a small number in the library. Students in such schools are in perpetual competition for computer time. As students progress through junior high to high school, even with the mandatory computer instruction in junior high, the competition increases as added high school graduation requirements and heavy academic loads for the college-bound compound and allow little time for electives. In addition, at these levels extracurricular activities and increased interest in social life leave little prospect for becoming involved in computers and computer activities unless that interest and involvement was begun at an early age, especially during early elementary school.

The purpose of the present survey was (1) to assess perceptions and attitudes of students about whether boys or girls spend more time working with computers; (2) to explore whether individual students at school prefer working alone or with someone else as is often the case; (3) to explore the possibility that girls who have access to home computers also have older brothers at home; (4) to inquire about parents' use or nonuse of computers at work or at home; and (5) to continue to assess the extent to which parents were providing home computers for daughters as well as for sons.

This survey was conducted as a follow-up to an earlier assessment (Reece, 1986) of the attitudes of fifth grade, seventh grade, and high school students toward gender and computer use at school and at home, as well as an exploration of local practices regarding parents' providing computers at home for sons and daughters. In that study no difference was found between parents providing home computers for sons or for daughters, but a difference was found between elementary and high school students with respect to computer use

attitudes. High school students tended to associate computer usage with males.

Some literature reports have indicated that girls preferred working with someone rather than alone: "One student to each computer--the usual school arrangement--doesn't meet adolescent girls' needs for social interaction" and "Girls stay out of the computer room because their girlfriends aren't there--an important social dynamic at the middle school age" (Sanders, 1985).

Intimidation of girls by more aggressive males has been reported by Campbell (1984): "Girls who 'give' their assigned computer time to boys frequently say they did it so that the boy 'will stop bothering me.' " The problem of getting left out with regard to computer experiences applies not only to girls but also to poor or nonwhite students; when computer use is extremely limited as in poorer schools, sex differences are even greater (Campbell, 1985).

Barriers to equitable computer learning have been identified: (1) dominance by one student over another during computer time, (2) bias against females and minorities in software and advertising, (3) potential value of computer learning more apparent to males, (4) lack of encouragement for females and minority students to use computers, (5) pressure from peers not to participate in computer activities, (6) underrepresentation of females and minority students in computer clubs, (7) limited computer access for females during free time at school, (8) underrepresentation of females in computer leadership roles, (9) inappropriate location of computers within schools, (10) shortage of qualified personnel for computer learning, (11) lack of out-of school computer access, (12) lack of early childhood computer readiness (13) irrelevant prerequisites for computer instruction, and (14) inability of

teachers and students to recognize and deal with problems in computer learning (Bakke, et al., 1985). It is crucial that computers in classrooms be used as tools in achieving a variety of goals--not just associated with math and science; it is also important that software design and the organization of learning in the classroom be geared toward personal usefulness for girls as well as for boys (Hawkins, 1985). McPhail (1985) suggested that if computers are introduced at the elementary level, it is likely that conventional sex-role stereotyping will not develop.

Elementary teachers ranked classroom integration of computers as top priority for inservice but stated that current staff inservice did not meet the need. Regarding their personal levels of computer competence, 73 percent rated themselves as insecure (Johnson & Hoot, 1986).

Stone (1987) recommended a joint effort between parents and schools to enhance students' computer knowledge, noting that low income families will often buy computers for their children if they believe an educational advantage exists in doing so. Schools need to advise parents about quality software and include parents in school computing activities.

Method

The student sample for the present study was largely made up of sixth-graders in existing classes to which access could be gained; the surveys took place during a two-year time span. Sixth graders (n = 22) at a private religious school were surveyed during Fall, 1985; the sixth grade (n = 65) at an optional elementary school (purported to be representative of the community) was surveyed during Spring, 1986; fourth through sixth grade gifted students (n = 30) who paid tuition to attend a creative computing class were surveyed during 1987; the subsequent sixth grade class (n = 80) at the

optional school was surveyed during Spring, 1987, as was a small fifth/sixth grade group (n = 15) at a private independent school. Such was an application of theoretical sampling (Glaser & Strauss, 1967) whereby ranges of groups evolve during data collection over some period of time. It also represented deliberate branching from the previous study in which fifth, seventh, and high school students were surveyed. Content and face validity were established by drawing questions from the earlier instrument (itself drawn directly from wide review of literature; see Reece [1986]) and modifying content as the instrument evolved following each usage. As a result of such instrument evolvement, not all questions presently addressed have been addressed from the beginning.

Results

No sex differences were observed with regard to parents' providing computers for sons and daughters in their home environments (see Figure 1); as a matter of fact, analyses have revealed no significant sex differences with respect to any of the questions. Literature reports had indicated that adolescent girls preferred working with someone, but no significant sex differences were observed among the students in this study--students some of whom within months became middle schoolers.

It was interesting that it had been reported previously that girls preferred working with someone else when at the computer but that no such sex difference was observed among these sixth graders. However, chi square analysis ($X^2 = 5.75$; $p = .056$) indicated a borderline significant difference among the 1987 optional school students with regard to proportions of students who prefer to work alone and those who have older siblings; within the group who had older siblings, a greater number than would be expected by chance

stated they preferred to work alone; fewer students than expected by chance indicated they had no particular preference regarding working alone or with someone.

Enlightening ethnographic interviews with a range of students from elementary to beginning high school level provided insights which could not have been gained through use of a survey instrument alone. The subjects interviewed represent an attempt to sample across a wider range in order to discern patterns of experiences with computers that reflect the reality of the world of today's young people--a technological world that remains foreign to many adults, including many teachers who are presently in classrooms.

A twelve-year-old girl is presently attending a church-related school that includes grades one through eight. At this new school she attends a computer class once each week, but so far they have spent most of the time talking about computers instead of working at the keyboard. Since it is early in the year, she anticipates more time at the keyboard later.

Last year in sixth grade she attended a public optional school. During sixth grade there was one computer in the classroom for about 28 students to use. The competition is intense. She related the following:

> Everyone tried to eat their lunch quickly, and get to the computer first, along with a partner. If the girls got there first, the boys came along and started to pester them, until they went back to their seats. They pulled their hair, and pressed the keys for them, and made faces at you, with their head in front of the screen. I usually got so frustrated and mad, that I went back to my seat, and watch[ed] the boys take over the whole computer area.

She thinks that boys spend more time working with the computer. As another student reported, "They get on it before we can get to it."

One elementary boy reported, "Sometimes the teacher doesn't let you get your turn on the computer. Sometimes she skips rows of people and start[s] over. Sometimes she won't let us have partners." A major frustration for him was the single computer in his classroom that was shared by the entire class during the school day. It was particularly painful for him to see the computer not being used at times when it was not his turn and he was not allowed to use the idle machine. Apparently the teacher did attempt to give all students opportunities to use the computer, but she was inattentive to the task of keeping careful track of the order of rotation of students. What she could not have known was that one boy who was so excited about computing and getting his turn at the keyboard was keeping very careful track of whose turn it was. He remembers her as the teacher who was not fair; she could have been letting him keep track of student turns at the computer or even instructing some who had a turn but were inexperienced. He said he enjoys working alone as well as with others and feels that boys and girls spend about equal amounts of time working with computers.

One girl, now past elementary level, said she does not understand the "big deal" about word processing, and most of the students she knows are not "all that thrilled" about the idea of using computers--most being more interested in social activities and/or being in honors programs for the college-bound which often allow for few electives. She also said, "My teachers have always made sure that everyone got an equal amount of time on the computer." She preferred working alone, but often helped other students--seldom seeking help herself. She thinks boys and girls spend about equal amounts of time with computers.

Discussion

Results of the study carry important implications for schools if, in fact, reports in the literature accurately reflect real barriers to equitable computer learning at school--and assumed ensuing career and income opportunities associated with higher technology. Results suggested ways in which teachers can identify behaviors which may reflect the existence of equity barriers. Although statistically significant differences in attitudes were not found among these elementary students, many instances of sex typing of computers were readily identifiable in survey responses.

While the present study focused on what might be labeled "more affluent" school groups, the earlier one did not, exclusively (see Figure 1*, reproduced from Reece [1986]). By comparing the two it can be seen that nearly 53 percent of students, overall, in the present study of these "more affluent" student groups do have computers at home; from the 1986 study those students in classes in public schools--the city high school and the county school fifth grade--which may be labeled "less affluent"--generally showed a rate of home computer ownership of approximately 33 percent or less. If in future sampling this pattern is confirmed, there is a sound rationale for schools to address the question of computer equity for students in "less affluent" schools.

What has emerged is a clearer picture of a larger reality in which students exist--a reality which seems to reinforce the thought that at the junior high level at which Tennessee has mandated computer instruction it is already too late to start. The junior high program needs to be revised and initiated at the third or fourth or grade, if not earlier, so that the enthusiasm of elementary students for computing can maximize learning, whether computer skills or reinforcement of basic academic skills through use of the technology.

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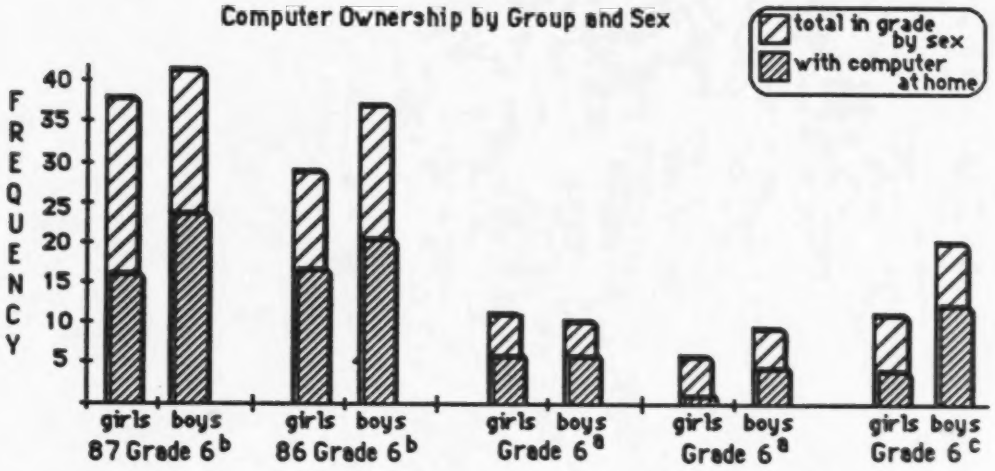
Figure 1

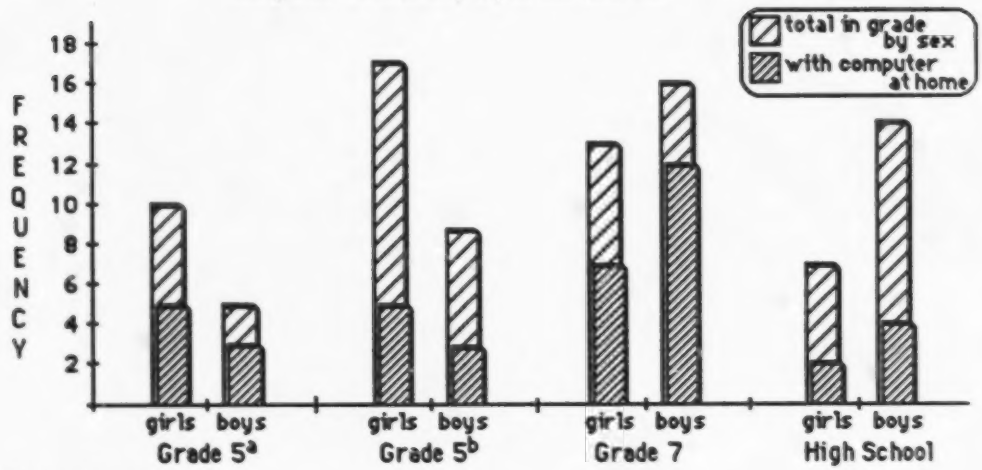
Computer Ownership by Group and Sex



[a]Private School
[b]Public Optional School
[c]Tuition Class for Gifted

Figure 1*

Computer Ownership by Grade and Sex



[a]Private School
[b]Public School
*From Reece (1986)